

**Van Rijn, RM, Huisstede BM, et al. Associations between work-related factors and specific disorders at the elbow: a systematic literature review. *Rheumatology* 2009;48:528-536.**

Design: Systematic review of published epidemiologic literature

Databases/selection and rating of articles:

- 13 observational studies of associations between work and four specific diagnoses of the upper extremity: lateral epicondylitis (LE), medial epicondylitis (ME), cubital tunnel syndrome, and radial tunnel syndrome
- Databases searched included MEDLINE, EMBASE, and Cochrane Library through Sept 2007, with articles in English, German, French, or Dutch
- To qualify for inclusion, the study had to report a quantitative description of measures of exposure in an occupational population, with a quantitative estimate of association (odds ratio, relative risk) between the measured exposure and one of the four specific diagnoses
- Quality was assessed on a 16-point scale by two reviewers, based on study population, adequate assessment of exposure and of the specific disorder, study design, and data analysis (control of confounding, etc)
- Three types of statistical association were distinguished: either positive (a higher level of the exposure was associated with an increased occurrence of the disorder), negative (a higher level of exposure was associated with a lower occurrence of the disorder), or null (no statistical association between the level of exposure and the occurrence of the disorder)

Main outcome measures:

- 633 potentially relevant articles were identified in the initial search; 13 met the inclusion criteria for inclusion: 9 cross-sectional studies, 2 case-control studies, and 2 cohort studies
- 3 articles reported on the occurrence of LE across occupations; 7 articles reported on associations between physical risk factors and LE (of which 3 also reported on ME); 3 articles reported on physical risk factors and ME and the 2 tunnel syndromes
- Methodological quality scores ranged from 3 to 15; higher quality studies were more likely to report a significant association than lower quality studies
- The 3 studies of LE and job title were all statistically null; none reported a significant association between occupational group and LE
- For LE and force, one case-control study reported a significant association for handling loads of >20 kg at least 10 times per day for 20 years; a cross-sectional study reported an association between handling tools >1 kg and LE, but null associations were reported for hand grip force and for handling loads >5 kg at least 2 times/minute for 2 hr/day
- 4 articles reported on associations between LE and repetitive movements; 2 of them reported a positive association between repetitive movements and LE in men and in women; 1 reported an association between repetitive movements and LE in women workers only

- Vibrating tool use was not associated with LE in the 2 studies that examined the association
- Combinations of force, repetitiveness, and posture were associated with LE in 1 case-control study, but not in one cross-sectional study confined to the fish-processing industry
- Low job control and low social support at work were positively associated with LE in 1 case-control study, which did not find an association between depressive symptoms or high job demands and LE
- Handling loads >5 kg or >20 kg, as well as high hand grip forces, were positively associated with ME
- Repetitive movements > 2 hr/day was positively associated with ME
- Vibrating tool use >2 hr/day was also positively associated with ME
- Only 1 study described the association between physical load factors and cubital tunnel syndrome; it reported a significant association with holding a tool in position, but not with force, vibration, or low job control
- Only 1 study reported the association between work and radial tunnel syndrome; it reported significant associations with force >1 kg 10 times/hr and with static work involving full elbow extension

#### Authors' conclusions:

- There is a large heterogeneity in the association between work load and specific upper extremity diagnoses, due to differences in definitions of exposure (force, repetition, vibration, posture) and to differences in how the diagnoses were arrived at (questionnaire, physical examination, electrodiagnostic studies)
- Some studies were weakened by small sample sizes, lack of longitudinal follow-up, low participation, and lack of demographic information
- There is more evidence for an association between force and vibration for ME than for LE, but there is similar evidence for both ME and LE having an association with repetitiveness
- For cubital and radial tunnel syndromes, relevant literature is mostly lacking
- Overall, LE appears to occur in association with handling loads >20 kg 10 times/day, with handling tools >1 kg, repetitive hand/arm movements >2 hr/day, and postures such as arms lifted in front of the body, hands bent or twisted, and precision movements during the working day
- ME appears to be associated with handling loads >5 kg for >2hr/day, loads >20 kg at least 10 times/day, repetitive movements >2hr/day, and vibrating tool use >2 hr/day
- Low job control and low social support are psychosocial risk factors for LE
- Cubital tunnel syndrome appears to be associated with 'holding a tool in position'
- Radial tunnel syndrome appears to be associated with static work of the hand with full elbow extension

#### Comments:

- The authors present a convincing argument that because of the heterogeneity of methods and measurements, it is not possible to do a meta-analysis and arrive at a pooled estimate of any risk factors for these 4 diagnoses
- The exposure levels reported in this systematic review should be regarded partly as artifacts of the research methods of the primary investigators; for example, the load of >20 kg at least 10 times per day is not a cutoff, but is due to the way that the original study authors divided up and analyzed their data
- The association between higher study quality and the measurement of a significant association suggests that the associations are likely to be real in the population, however imprecisely they have been estimated in the available literature
- The lack of an association between grip force and lateral epicondylitis is not surprising, due to the fact that grip force stresses the flexors rather than the extensor muscles of the forearm
- The association between hand-arm vibration and LE (greater odds ratio for vibrating tool use 25-50% of the time than for >75% of the time) meets the authors' definition of a negative association and should be reported as such
- Because so many of the included studies are cross-sectional in design, the causal relationships cannot be assumed (correlates of survival are difficult to distinguish from causal factors)
- However, the Haahr case-control study on LE was adequate for the joint effects of high force, repetition, and extreme posture
- Descatha 2003 was scored as adequate on exposure definition and assessment; however, wrist flexion, unscrewing, and strenuous movements were not included in the questionnaire, and "turning and screwing" will involve supination for a right handed person and pronation for a left-handed person; they do not usefully describe a work exposure
- The odds ratios quoted for some exposures such as repetition (Shiri 2006) depend on exposure definitions that are too vague to interpret (e.g., repetitive movements more than 2 hours per day), and should not be taken at face value
- Similarly, Shiri 2006 combined three measures of force into a single variable: grip force, 5 kg twice per minute for 2 hours/day, and 20 kg 10 times/day; this was done for purposes of analysis, but precludes making a single quantitative statement about the load in kg

Assessment: Adequate for evidence statement that a combination of force and repetition, or a combination of force, repetition, and extreme posture, increase the risk of epicondylitis.